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CLINICAL AND BEHAVIORAL PRACTICES OF PRIMARY HEALTHCARE PHYSICIANS IN ANTIBIOTICS PRESCRIBING IN GREECE

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ABSTRACT

Aim: To evaluate primary health physicians' clinical and behavioral practices towards antibiotics administration in a specific region in Greece.

Materials and methods: A cross sectional study was conducted using a questionnaire in all structures of primary health care (PHC) of the Peloponnese Region. The study was conducted in May-October 2020.

Results: In total, 306 out of 404 primary healthcare physicians completed the questionnaire (response rate of 75.8%). Our results showed that most of physicians used to prescribing antibiotics empirically in common diseases, except for the prevention of secondary respiratory tract infection. Overall, 66.3% answered that they do not feel diagnostic uncertainty that would lead them to prescribe antibiotics. Approximately 40% of the physicians stated an increase on antibiotics use and patients demand for antibiotic prescribing, however 71.4% "rarely/never" affected by this requirement. 51.9% of the sample used to prescribed brand name antibiotics. Statistically significant differences were found between demographic and professional characteristics, and physicians' clinical and behavioral practices ($p \leq 0.05$).

Conclusions: Our findings could provide decision makers with information on how to manage antibiotic prescribing in primary health care in the country, focusing mainly on the use of specific diagnostic tests as well as relevant guidelines and protocols for changing prescription behavior.

KEY WORDS: Antibiotics, physicians, primary care, prescribing practices, irrational prescription, Greece.

INTRODUCTION

Antibiotics since their discovery, have been acknowledged as one of the most cost-effective life-saving pharmaceutical substances, which have significantly contributed to the extension of life expectancy [1]. This drugs' category is not only used widely for the treatment of infections but also for the prevention of surgical wound infection and as prophylaxis in immune compromised individuals [1]. However, antibiotics continue to be the most administered medications worldwide due to their inappropriate use in both quantity and drug choice [2]. It is well known that the unnecessary and inappropriate use of antibiotics can lead not only to antibiotics' ineffectiveness, but also to antimicrobial resistance, with significant increases in morbidity, mortality and costs [3-7].Although antibiotics' overuse occurs both inpatient and outpatient health care, it is estimated that four-fifths of antibiotics are approximately prescribed in primary health care [8,9]. Primary health care practitioners have been shown to account for most antibiotic prescribing [10]. More specifically, the most common use of antibiotics for both adults and children in primary care, is for respiratory and gastrointestinal infections [11-13], caused mostly by viruses that are not recommended to be treated with antibiotics without the use of a diagnostic test [14].

In the developing countries, it is estimated that 20 percent of antibiotics (consumption) is used in hospitals and other healthcare facilities 80 percent in the community, either prescribed by healthcare providers or purchased directly by consumers without prescription [15].

There are many and complex socioeconomic and behavioral factors linked to the misuse of antibiotics among health professionals. The most common are the lack of clinical education, availability of information, communication between doctor and patient and motivation, the workload pressure and fear about legal coincidences, patient pressure and demand as well as diagnostic uncertainty [16-18].

The international literature indicates numerous interventions related to physicians' behavior and concerns in antibiotics' prescribing, to improve and change their clinical and behavioral practices [16-18]. Greece is presenting the highest antibiotic prescribing among the European countries with a double use in primary health care compared to the EU average [7,10,19,20].

AIM

Thus, the aim of this study was to evaluate primary health physicians' clinical and behavioral practices towards antibiotics administration in a specific region in Greece. It should be noted that PHC delivery in Greece is provided within the context of a unified, integrated, and decentralized system organized by the National Health System (NHS), locally operated by the Regional Health Authorities (DYPE).

MATERIALS AND METHODS

A cross-sectional study took place in all NHS primary healthcare settings of the Peloponnese Region, addressed to 34 primary healthcare settings, 404 physicians and 1.046.897 residents. Private consultation offices were excluded from the analysis. Prior the initiation of the survey, permission was given by the 6th Regional Health Authority as well as by the Ethics Committee of the University of Peloponnese. The survey was conducted from May to October 2020.

An anonymous, self-administered questionnaire was structured based on previous Greek studies focused on primary and hospital care [21-24]. The tool survey was distributed to primary healthcare physicians, including questions related to their demographic and occupational characteristics as well as their prescribing behaviors.

STATISTICAL ANALYSIS

The descriptive analysis was presented by mean values and standard deviation (SD) for the quantitative and by percentages for the qualitative variables. Due to the non-normal distribution of the data, nonparametric tests were applied. To determine whether there is a relation between the categorical variables, the Chi-Square test was used. The Kruskal-Wallis test was used to examine statistically significant differences between three or more groups, while the Mann-Whitney test was used to compare differences between two independent groups. Statistical significance was set to $p = 0.05$. The statistical analysis was performed using the SPSS 25.0 program.

RESULTS

A total of 306 out of 404 physicians (Table 1) answered to the survey, with a response rate 75.8%. The majority (52.6%) was men with a mean age of 40.7± 11.1 years. 60.8% were General Practitioners (GPs) and the rest other specialties. Also, 51.3% of participants had more than 11 years of professional experience, and 24.5% had a postgraduate degree (Table 1). Regarding the administration of antibiotics in common pediatric diseases, as shown in Fig 1, the majority of physicians used to implement the "watchful waiting" approach in acute otitis media and administer «often-very often» empirical antibiotic therapy in pharyngitis managing a possible streptococcus group A infection. However, they used to administer «rarely-never» antibiotics in children who had no other health issues in order to prevent secondary respiratory tract infections.

The physicians were also asked, if they feel diagnostic uncertainty leading to antibiotic prescribing and 66.3% answered negatively. Respiratory tract infections (39.5%), urinary tract infections (24.3%), bronchitis (15%) and diarrhea (6.3%) were stated as the most important reasons of diagnostic uncertainty, whereas «no reason» were reported by the rest of physicians. Also, the use of diagnostic rapid tests (67.7%) as well as the adoption of special guidelines and protocols (59.4%) were reported as the most important measures for minimizing diagnostic uncertainty.

Table 1. Physicians' sociodemographic characteristics

Sample characteristics	No	Percentages (%)
Age group		
≤40 years	117	40.2
≥41 years	174	59.8
Gender		
Men	160	52.6
Women	144	47.4
Physicians' Specialties		
General practitioners (GPs)	186	60.8
Pediatricians	32	10.5
Neurologists, pneumonologists, cardiologists	25	8.2
Internal medicine physicians	14	4.6
Rural physicians (non-specialized)	49	16
Years of work experience		
≤10 years	149	48.7
≥11 years	157	51.3
Postgraduate qualifications		
None	231	75.5
MSc/PhD	75	24.5

Statistically significant differences were found between physicians' age and measures for minimizing diagnostic uncertainty. More specifically, 83.3% of older physicians (>45 years old) believe that rapid tests available for streptococcus diagnosis are useful for minimizing diagnostic uncertainty compared to 41.7% of younger physicians (<45 years old) (p=0.018). Moreover, 67.7% of physicians with ≤10 years' work experience believe that the adoption of special guidelines and protocols are important measures for minimizing diagnostic uncertainty compared to 52.3% of physicians with ≥11 years' work experience (p = 0.008).

According to Fig 2, approximately 38.5% of physicians considered that antibiotics' prescription could be reduced by 11%-20% without impacting on the disease's outcome and believed that the same percentage was irrational in their primary healthcare setting.

According to Table 2, a significant finding occurs in the physicians' perception of the stability on antibiotics use and patient-parental demand for antibiotic prescribing during the last five years, as well as a relevant increase.

In Table 3 is presented the statistically significant differences between physicians' occupational characteristics and patient-parental demand for antibiotic prescribing, where general practitioners, internal medicine physicians and those with ≥11 years' work experience, reported a stability on patient-parent demand.

Despite the fact that most of the physicians (71.4%) reported that their prescribing habits for antibiotics were «rarely/never» influenced by patients/ parental demand, our analysis showed that 45.5% of younger physicians (<45 years old) stated that they were influenced «very often-often» compared to 11.8% of older physicians (>45 years old) (p=0.044).

Also, 51.9% of all respondents declared that they recommend brand name antibiotics, 39.9% branded generics and only 8.2% generics. However, most pediatricians (64.5%), rural physicians (68.8%) and other specialties (88%), such as neurologists, pneumonologists, cardiologists, used to propose brand name antibiotics, compared to 50% of GPs and 40% of internal medicine physicians who usually recommend branded generics (p =0.001).

DISCUSSION

This study aimed to investigate the prescribing practices of physicians operating in primary health care settings in a geographical area in Greece.

Our results showed that most physicians often prescribe antibiotics for undiagnosed group A streptococcal infection and uncomplicated acute otitis media, however they rarely administer antibiotics to prevent secondary respiratory infections. In addition, they are not affected by patients or parents' requirement, do not feel diagnostic uncertainty, and they consider treatment protocols as well as availability of diagnostics as significant measures to reduce diagnostic uncertainty.

According to our findings, the prescribing practices of physicians with regards to common childhood diseases agree with those reported in the international literature. More specifically, studies focusing on hospital and PHC reported "watchful waiting" rates ranging from 60-65% [23, 25,26] and significant rates of empirical administration of antibiotics as well as more prudent use in respiratory diseases for the prevention of secondary bacterial infections [23, 27]. Our results provided evidence that 2 out of 10 of primary healthcare physicians administer antibiotics for the prevention of bacterial infections. Given that common respiratory tract infections represent the most common cause of prescribing antibiotics especially in primary health care [23,28,29], this finding raises hopes for a possible improvement in the therapeutic approach of viral respiratory infections in the future.

With regards to the greater diagnostic uncertainty related to antibiotic prescribing, most of respondents reported respiratory and urinary tract infections as the common reasons, which is in contrast with previous studies indicating otitis as the frequent cause [23,28]. Additionally, concerning the measures that should be taken to reduce diagnostic uncertainty, the use of therapeutic guidelines and rapid tests were the most reported, a finding which is common to those of previous studies conducted in outpatients pediatric offices [28,30]. It was observed that the younger physicians prefer the therapeutic protocols compared to their senior colleagues, a finding which is expectable given that the protocols are more familiar to them as modern and supportive diagnostic tools.

Parental demand in primary pediatric care has been well documented in the international literature [26, 31-33]. Most of physicians reported that they are rarely or never influenced by patients' or parental demand for antibiotics' prescribing despite the observed increasing tendency towards this demand. According to the international literature, GPs often perceive patients' expectations for prescribing antibiotics, and may overestimate their explicit or implicit request [34].

It should be noted that the higher rates of parental demand reported by younger physicians might be attributed to their lower experience compared with the specialized pediatricians.

Regarding the possible reduction of antibiotics, approximately 4 in 10 participants considered that antibiotics' prescription could be reduced by 11%-20%, without impacting on the disease's outcome and believed that the same percentage was irrational in their primary healthcare setting. It is assumed that GPs' perception, for the prescribing antibiotics' reduction with a safer way, is due to their desire to increase the use of supportive diagnostics tools which could minimize diagnostic uncertainty and patients' influence.

Finally, more than half of those surveyed, recommend brand name antibiotics rather than branded generics. This finding could be explained by the fact that distrust from both physicians and patients has been observed toward generics' effectiveness in previous Greek studies [35, 36].

There are some limitations that need to be men-

tioned. Although the study was representative of the PHC structures in the Peloponnese region, further studies are needed in other Regions to generalize the findings in Greece. Another limitation refers to the use of this questionnaire. Subjective response and recall bias, which characterizes all questionnaire-based surveys, should be considered as a further constraint.

Table 2. Physicians' perceptions on antibiotics use and patients' demand for prescribing the last five years.

	Antibiotics use	Patient-parental demand
Increase	37.8 %	41.1%
Stability	42.5%	43.1%
Decrease	11.5%	9.5%
Dk/Da*	8.2%	6.3%

**Don't know/ don't answer*

Table 3. Patient-parental demand for antibiotic prescribing compared to physicians' occupational characteristics.

	Patient- parental demand for antibiotic prescribing				P value
	Increase	Stability	Decrease	Dk/Da*	
Physicians' Specialties					
General practitioners (GPs)	39,8%	48,9%	10,2%	1,1%	0.001
Pediatricians	37,5%	28,1%	15,6%	18,8%	
Neurologists, pneumonologists, cardiologists	50,0%	33,3%	4,2%	12,5%	
Internal medicine physicians	42,9%	50,0%	7,1%	0,0%	
Rural physicians (non-specialized)	43,8%	33,3%	6,3%	16,7%	
Years of work experience					
≤10 years	43,9%	37,8%	6,8%	11,5%	0.001
≥11 years	38,5%	48,1%	12,2%	1,3%	

**Don't know/ don't answer*

CONCLUSIONS

Greek doctors in PHC usually apply empirical antibiotic treatment, do not feel diagnostic uncertainty, and are not affected by patients' demand for antibiotics. The results of the study provide data on the difference between antibiotic prescribing and diagnostic uncertainty with the professional and demographic characteristics of physicians.

Our findings could provide decision-makers with information to manage the prescribing of antibiotics in PHC, focusing mainly on the existence of relevant guidelines-protocols as well as the availability of specific diagnostic tests. These measures can contribute significantly to diagnostic uncertainty minimization by ruling out the possibility of viral infections and simultaneously the administration of antibiotic therapy.

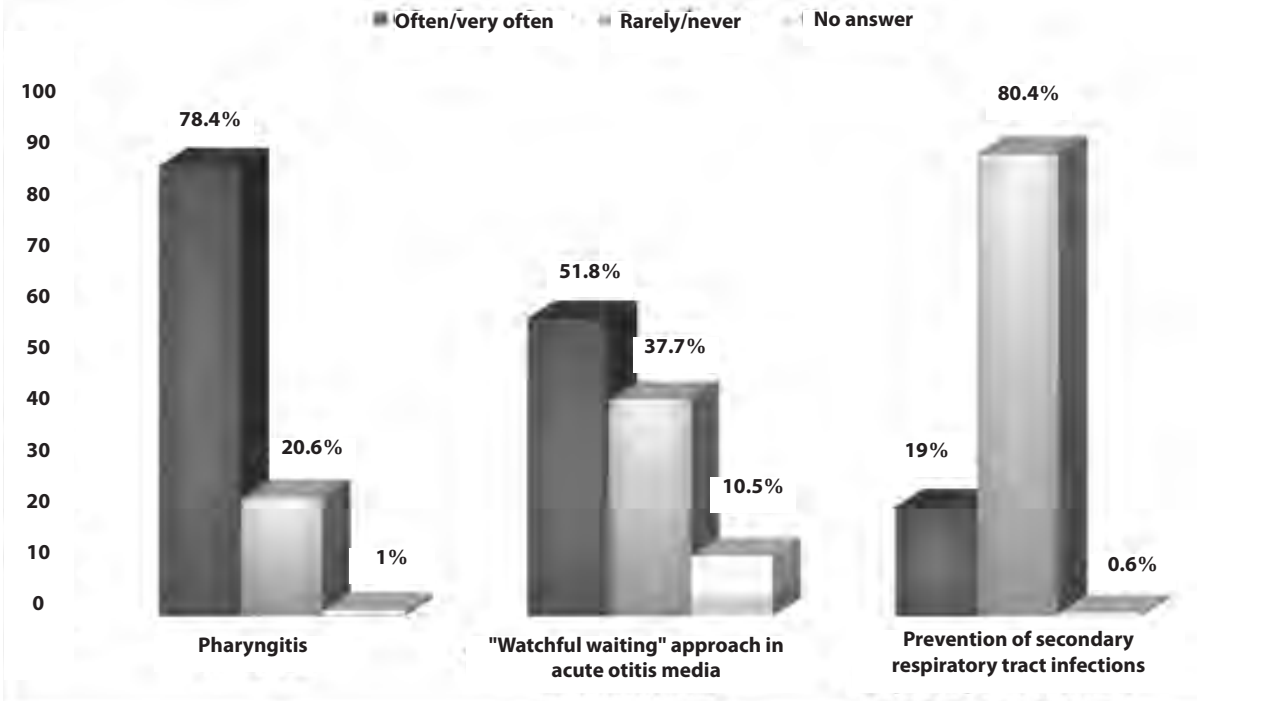

Fig 1. Administration of antibiotics in common diseases.

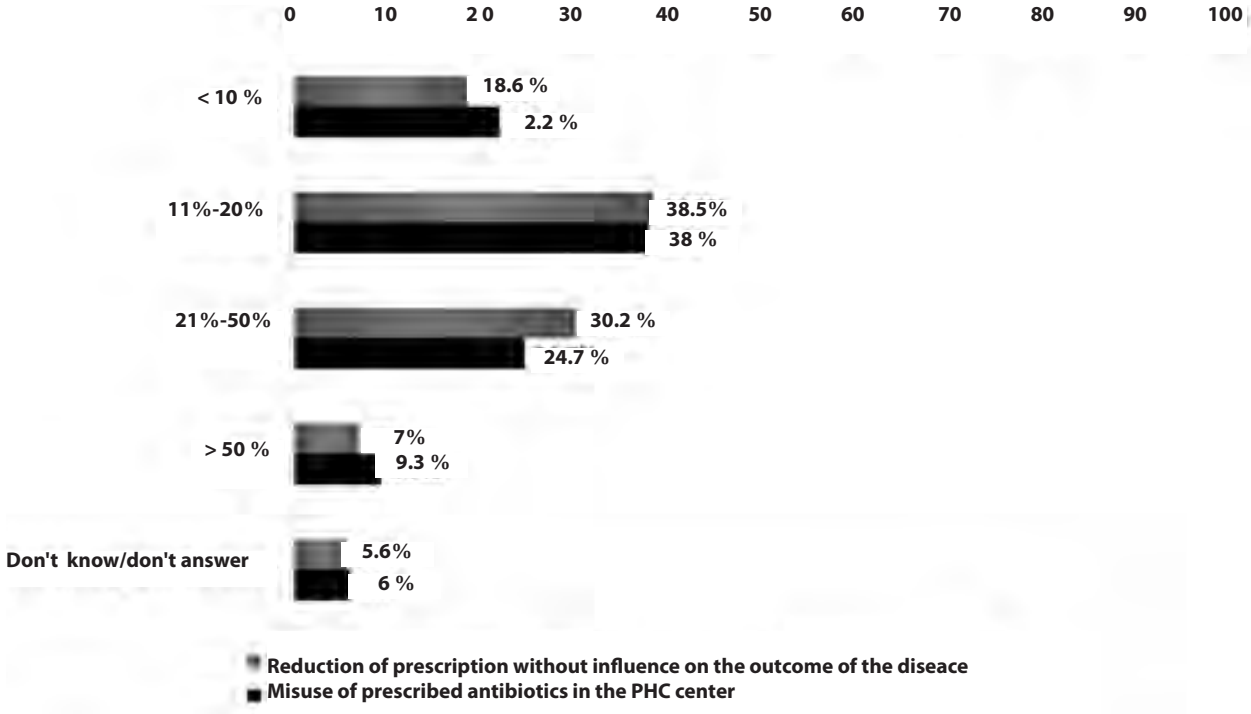

Fig 2. Believes on irrational and use and potential antibiotic misuse and reduction in PHC.

REFERENCES

1. O'Neill J. Antimicrobial resistance: tackling a crisis for the health and wealth of nations. The review on antimicrobial resistance. 2014, p.16.
2. Hashemi S, Nasrollah A, Rajabi M. Irrational antibiotic prescribing: a local issue or global concern? EXCLI J. 2013 ;12:384-95.
3. Wang CH, Hsieh YH, Powers ZM, Kao CY. Defeating Antibiotic-Resistant Bacteria Exploring Alternative Therapies for a Post-Antibiotic Era. Int J Mol Sci. 2020;21(3):1061. doi: 10.3390/ijms21031061.
4. Holmes AH, Moore LS, Sundsfjord A et al. Understanding the mechanisms and drivers of antimicrobial resistance. Lancet. 2016;387(10014):176-87.
5. Kritsotakis EI, Christidou A, Roumbelaki M et al. The dynamic relationship between antibiotic use and the incidence of vancomycin-resistant Enterococcus: time-series modelling of 7-year surveillance data in a tertiary-care hospital. Clin Microbiol Infect 2008;14(8):747-54.
6. Lawes T, Lopez-Lozano JM, Nebot CA, Macartney G et al. Effects of national antibiotic stewardship and infection control strategies on hospital-associated and community-associated meticillin-resistant Staphylococcus aureus infections across a region of Scotland: a non-linear time-series study. Lancet Infect Dis. 2015;15(12):1438-49.
7. Centers for Disease Control. Antibiotic. Antimicrobial Resistance. 2018. https://www.cdc.gov/drugresistance/index.html [date access 06.05.2023].
8. Pinder R, Sallis A, Berry D, Chadborn T. Behaviour Change and Antibiotic Prescribing in Healthcare Settings: Literature Review and Behavioural Analysis. Public Health. England: London, UK. 2015. doi: 10.13140/RG.2.1.4657.4245.
9. Costelloe C, Metcalfe C, Lovering A et al. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. BMJ. 2010;340:c2096.
10. Goossens H, Ferech M, Vander Stichele R, Elseviers M. ESAC Project Group. Outpatient antibiotic use in Europe and association with resistance: a cross-national database study. Lancet. 2005;12-18;365(9459):579-87.
11. Kotwani A, Chaudhury RR, Holloway K. Antibiotic-prescribing practices of primary care prescribers for acute diarrhea in New Delhi, India. Value Health 2012;15(1):S116-9.
12. Faber MS, Heckenbach K, Velasco E, Eckmanns T. Antibiotics for the common cold: expectations of Germany's general population. Euro Surveill. 2010;15(35):19655.
13. Van der Velden AW, Pijpers EJ, Kuyvenhoven MM et al. Effectiveness of physician-targeted interventions to improve antibiotic use for respiratory tract infections. Br J Gen Pract. 2012;62(605):e801-7.
14. Kerremans JJ, Verboom P, Stijnen T et al. Rapid identification and antimicrobial susceptibility testing reduce antibiotic use and accelerate pathogen-directed antibiotic use. J Antimicrob Chemother 2008;61(2):428-35.
15. Teng CL. Antibiotic prescribing for upper respiratory tract infections in the Asia-Pacific region: A brief review. Malays Fam Physician 2014;9(2):18-25.
16. Lampi E, Carlsson F, Sundvall PD et al. Interventions for prudent antibiotic use in primary healthcare: an econometric analysis. BMC Health Serv Res. 2020;20(1):895.
17. Machowska A, StålsbyLundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int J Environ Res Public Health. 2018;16(1):27.
18. Gonzalez-Gonzalez C, López-Vázquez P, Vázquez-Lago JM et al. Effect of Physicians' Attitudes and Knowledge on the Quality of Antibiotic Prescription: A Cohort Study. PLoS One. 2015;10(10):e0141820.

19. Kontarakis N, Tsiligianni IG, Papadokostakis P et al. Antibiotic prescriptions in primary health care in a rural population in Crete, Greece. BMC Res Notes. 2011;4:38.
20. European Centre for Disease Prevention and Control, Stockholm. 2013. www.ecdc.europa.eu/sites/default/files/documents/antibiotics-resistance-EU-data-2013.pdf [date access 15.05.2023]
21. Toska A, Geitona M, Souliotis K et al. Adverse drug reaction reporting related to the administration of antibiotics in hospitalized pediatric patients in Greece. Curr Drug Saf. 2014;9(1):49-55.
22. Toska A, Geitona M. Antibiotic resistance and irrational prescribing in paediatric clinics in Greece. Br J Nurs. 2015 ;24(1):28-33.
23. Geitona M, Toska A, Souliotis K et al. Antibiotic Prescription Practices of Pediatricians and Pediatric Residents in Hospital Care in Greece. Curr Drug Saf. 2015;10(3):221-6.
24. Geitona M, Toska A, Latsou D, Saridi M. Detection and Reporting of Adverse Drug Reactions Related to Antibiotics in Primary Healthcare in Greece. Curr Drug Saf. 2022;17(3):217-224.
25. Stille CJ, Rifas- Shiman SL, Kleinman K et al. Physician responses to a community-level trial promoting judicious antibiotic use. Ann Fam Med. 2008; 6(3):206-12.
26. Lum EPM, Page K, Whitty JA et al. Antibiotic prescribing in primary healthcare: Dominant factors and trade-offs in decision-making, Infection. Disease & Health. 2018; 23(2):74-86. doi:10.1016/j.idh.2017.12.002.
27. Paluck E, Katzenstein D, Frankish CJ et al. Prescribing practices and attitudes toward giving children antibiotics. Can Fam Physician. 2001; 47:521-7.
28. Moro ML, Marchi M, Gagliotti C et al. Why do pediatricians prescribe antibiotics? Results of an Italian regional project. BMC Pediatr. 2009; 9:69. doi: 10.1186/1471-2431-9-69.
29. Yagupsky P. Selection of antibiotic –resistant pathogens in the community. Pediatr Infect Dis J. 2006; 25(10):974-76.
30. Gervaix A, Egger M Lacroix L, Harbarth S. Pediatricians' perception of antibiotic use in children in two large Swiss cities. Int J Antimicrob Agents. 2007; 30(3):281-3.
31. Bagshaw SM, Kellner JD. Beliefs and behaviors of parents regarding antibiotic use by children. Can J Infect Dis. 2001; 12(2): 93-97.32.
32. Mangione-Smith R, Elliott MN, Stivers T et al. Ruling out the need for antibiotics: are we sending the right message? Arch Pediatr Adolesc Med. 2006; 160(9):945-52. doi: 10.1001/archpedi.160.9.945.
33. Panagakou S, Spyridis N, Papaevangelou V et al. Antibiotic use for upper respiratory tract infections in children: A cross sectional survey of knowledge, attitudes and practices of parents in Greece. BMC Pediatrics. 2011; 11:60.
34. Van der Zande MM, Dembinsky M, Aresi G, van Staa TP. General practitioners' accounts of negotiating antibiotic prescribing decisions with patients: a qualitative study on what influences antibiotic prescribing in low, medium and high prescribing practices. BMC Fam Pract. 2019 ;20(1):172.
35. Xanthopoulou SS, Katsaliaki K. Policies and perceptions on generic drugs: The case of Greece. Health Serv Manage Res. 2019;32(1):49-56.
36. Domeyer PJ, Katsari V, Sarafis P et al. Greek students' attitudes, perception and knowledge regarding generic medicines in times of economic crisis: a cross-sectional study. BMC Med Educ. 2018;18(1):262.

We declare that this work is the third part of a survey conducted in Primary Health settings of the District of Peloponnese in Greece

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CONFLICT OF INTEREST
The Authors declare no conflict of interest.

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